The Study of Anthropometric Measurements of Newborn Babies in Relation to Gestational Age

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Research Article

Abstract: The body measurements of infant at birth act as an index of child's health and in turn predict the future growth of infant. There are various physiological and pathological factors affecting the anthropometric parameters of the newborns. One of the physiological factors is the gestational age of the newborn which has a profound influence on the intrauterine growth of the foetus. The present study is conducted in 200 newborn babies. All the anthropometric parameters in the newborns born less than 37 weeks, 38 to 40 weeks and more than 40 weeks of gestational age showed an increase in their mean values with the increase in gestational age which were statistically significant.

Keywords: Anthropometric parameters, gestational age, newborns.

Introduction

Anthropometry is the measurements of man that provides scientific methods and techniques for taking various measurements and observations on the living man and the skeleton [1]. The dimensions of newborn's body can be basis for all changes in anthropometric measurements which may be due to various maternal and infantile variables influencing foetal growth [2]. One such important infantile factor affecting the anthropometric parameters of the newborns is the gestational age of the babies which is purely physiological in nature. The use of anthropometric references for the evaluation of intrauterine growth has shown that children whose growth was restricted are more predisposed to metabolic disturbances during the neonatal periods and alteration in somatic and neurocognitive development during infancy and increased morbidity and mortality in the first year of +life and the appearance of chronic non transmissible diseases during childhood [3]. A number of studies have been done previously on the gestational age influencing the anthropometric parameters Lubencho LO et al. (1966) [4], Balakrishnan S and Puri RK (1973) [5]. An attempt has been made through this study to provide more information regarding the gestational age influencing the changes in various anthropometric measurements of newborns and their clinical correlations.

Materials and Methods

Source of data

The present study was undertaken on 200 live newborn infants from the Department of Obstetrics and Gynaecology, Cheluvamba hospital for children and women, MMC and RI, Mysore. The subjects were considered for study irrespective of gestational age at birth, sex, maternal illness and mode of delivery.

Instruments

1. Electronic weighing scale with graduations of 25gm
2. Non-stretchable, flexible measuring tape
3. Infantometer

Data collection

Relevant history regarding gestational age of the newborn and informed consent was taken from the mother for measuring the anthropometric parameters of newborns.

The following anthropometric measurements were recorded in the newborn within 24 hours of birth except head circumference,

a. Birth weight: By using electronic weighing scale to the nearest of 20 gram.(figure 1)
b. Crown heel length:By using infantometer to the nearest of 0.1 cm, in supine position with knees fully extended.(figure 2)

The following measurements were recorded by using measuring tape to the nearest of 0.1cm,

c. Head circumference was recorded 24 hours after birth to avoid the effect of head moulding and oedema. It was measured at the level of occipital protuberance, above supraorbital ridges and the ears.(figure 3)
d. Chest circumference: At the level of the nipple in a plane at right angle to the spine and recorded the measurement in mid respiration.(figure 4)
e. Abdominal circumference: It is recorded just above the umbilical cord.(figure 5)

f. Mid-arm circumference: At the midpoint between the tip of the acromion and the olecranon process.(figure 6)
g. Thigh circumference: At the level of the lowest gluteal furrow of the thigh in supine position perpendicular to the long axis of the limb.(figure 7)
h. Calf circumference: At the most prominent point in semiflexed position of leg. Calf circumference: At the most prominent point in semiflexed position of leg. (figure 8)

Figure 1: Measurement of birth weight

Figure 2: Measurement of crown heel length

Figure 3: Measurement of head circumference

Figure 4: Measurement of chest circumference

Figure 5: Measurement of abdominal circumference

Figure 6: Measurement of mid arm circumference

Figure 7: Measurement of thigh circumference

Figure 8: Measurement of calf circumference

Observation and Result

In the present study conducted on 200 newborn babies, the mean values and their p-values of the anthropometric parameters of the newborns born at gestational age less than 37 weeks,38 to 40 weeks and more than 40 weeks have been shown in the table and the bar diagram.

Gestational age in weeks	Anthropometric parameters							
	BW	CHL	HC	CC	AC	MAC	TC	CAC
<37	1.94±0.53	43.32±2.82	29.82±2.89	27.57±3.11	25.7±2.61	7.86±1.69	12.25±2.71	8.09±1.66
38-40	2.81±0.5	46.97±2.58	31.62±1.92	30.95±1.87	28.9±1.81	9.68±1.05	15.72±1.59	10.06±1.00
>40	3.12±0.37	50.22±2.44	33.59±1.47	31.38±1.51	30.16±1.54	10.09±0.61	16.09±0.89	10.34±0.50
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Legend
BW: Birth Weight, CHL: Crown Heel Length, HC: Head Circumference, CC: Chest Circumference, AC: Abdominal Circumference, MAC: Mid-Arm Circumference, TC: Thigh Circumference, CAC: Calf Circumference

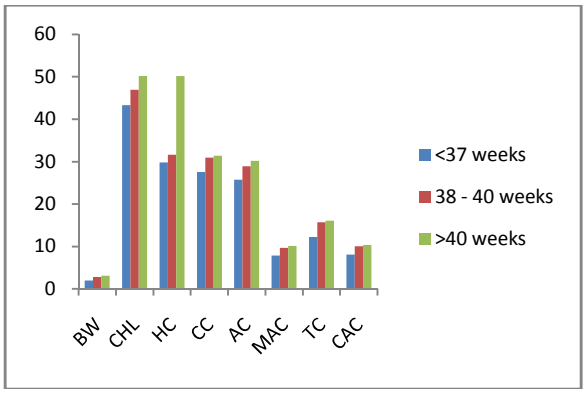

Figure 1: Anthropometric parameters (BW, CHL, HC, CC, AC, MAC, TC, CAC) with respect to gestational age

Discussion

Gestational age of the baby is one of the factors determining its physical parameters. Amongst the various facets of neonatology, the establishment of "norms" of various physical parameters of the newborn is being given more and more importance because such studies aid in determining the baseline of physical and mental parameters of newborn and the maternal factors influencing it which help in the management of subnormal and abnormal neonates [6]. Gestational age and neonatal anthropometric parameters are significant productive factors of neonatal and adult morbidity. In the present study, all the anthropometric parameters in the newborns born less than 37 weeks, 38 to 40 weeks and more than 40 weeks of gestational age showed an increase in their mean values with the increase in gestational age which were statistically significant ($p<0.05$). In a study conducted by Carrascosa A et al.(2004) [7] involving only the birth weight, crown heel length and head circumference analysed that the mean values of these parameters progressively increased with gestational age from the 30th week of gestation onwards, with statistically significant difference ($p<0.05$) for all parameters at 38 to 42 weeks of gestational age. In the present study, in addition to birth weight, crown heel length and head circumference, other important anthropometric parameters of newborns like chest, calf, mid arm, thigh and calf circumferences were also taken into consideration to correlate with the gestational age of the newborns which also showed statistically significant ($p<0.05$) increase in their mean values with the increase in gestational age.

Conclusion

The anthropometric approach to the heterogenecity of the intrauterine growth seems to be a simple and very useful tool in somatic classification and evaluation of the newborn infant. The gestational age of the newborn being one of the important infantile factors influencing the physical parameters of the newborn which in turn affects the future physical and mental development of the newborns. The present study undertaken with an aim to determine the influence of gestational age on the anthropometric parameters of newborns showed a statistically significant higher mean values of all the parameters with increase in gestational age which is in conformity with the previous studies. Thus the anthropometric approach can be of great help in exploring the relationship of body size and various infantile factors influencing it which can be correlated clinically as well.

References

1. Singh IP, Bhasin MK. A laboratory manual on biological anthropology. 1sted.New Delhi, India: Kamal- raj Enterprises; 1989. P. 1.
2. Golalipour MJ, Haidari K, Jahanshahi M, Farahani RM. The shapes of head and face in normal male newborns in South – East of Caspian sea (Iran, Gorgan). J Anat Soc Ind 2003;52:1-5.
3. Bettiol MDH. Neonatal anthropometry and neonatal outcome. Sao Paulo Med J 2003;121(4).
4. Lubencho LO, Hansman C, Boyd E. Intrauterine growth in length and head circumference as estimated from live births at gestational ages from 26 to 42 weeks. Pediatrics 1966;37:403-408.
5. Balakrishnan S and Puri RK. Fetal age and anthropometric parameters. Indian pediatr 1973 Jun;10(6):365-371.
6. Pandove SP, Singh H, Kaur B, Ramakumar L, Mohan V. Influence of sex on the physical parameters of the newborn. Indian J Pediatr 1978;45:285-8.
7. Carrascosa A, Yeste D, Copil A, Almar J, Salcedo S, Gussinye M. Anthropometric growth patterns of preterm and full term newborns (24-42 weeks of gestational age) at the Hospital Materno-Infantil Vall d'Hebron (Barcelona). Pediatr (Barc) 2004 may;60(5):406-16.